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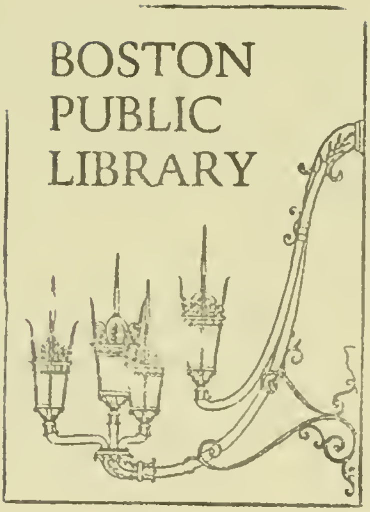

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DEBRIS AND REFUSE IN BOSTON HARBOR THE PROBLEM AND SOLUTION

BOSTON HARBOR COORDINATING GROUP

October 1974

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DEBRIS AND REFUSE
IN BOSTON HARBOR

THE PROBLEM AND SOLUTION

October 1974

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Metropolitan Area Planning Council
Metropolitan District Commission
New England River Basins Commission
U.S. Army Corps of Engineers
U.S. Environmental Protection Agency

And in cooperation with the:

Massachusetts Department of Public Works, Division of Waterways

Southeastern New England
Water and Related
Land Resources Study

NERBC

NEW ENGLAND RIVER BASINS COMMISSION
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To the Conferees of the enforcement conference in the matter of pollution of the navigable waters of Boston Harbor and its tributaries in Massachusetts.

At the enforcement conference convened on April 30, 1969, the conferees agreed that a water quality management plan would be completed for the Boston Harbor Drainage Area under the leadership of the Massachusetts Division of Water Pollution Control and the Federal Environmental Protection Agency with the New England River Basins Commission serving as a coordinating vehicle and with timely interim reports and recommendations published during the planning process.

The preliminary findings of the Coordinating Group indicated that debris and refuse present a significant deterrent to the achievement of water quality goals and severely degrades the aesthetic and recreational values of the Harbor.

This report evaluates the extent of the debris and refuse problem in Boston Harbor and suggests some possible alternatives for remedial action.

A program for cleaning up Boston Harbor and minimizing the sources of debris and refuse is already underway. This progress combined with strengthened efforts in the future will result in substantial upgrading of the Harbor environment.

Sincerely yours,

Frank Gregg

R. Frank Gregg
Chairman

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ACKNOWLEDGEMENTS -

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TABLE OF CONTENTS

SECTION PAGE NO.

I. Summary and conclusions 1

II. Introduction 5

III. Analysis of problem 9

IV. Impact of problem on Harbor environment 14

V. Current remedial action 20

VI. Recommendations for future action 24

TABLES

I. Boston Harbor debris study 33

II. Solid waste from MDC, Boston Harbor Reservations 34

III. Debris picked up in Boston Harbor 35

DEBRIS AND REFUSE IN BOSTON HARBOR

I. SUMMARY AND CONCLUSIONS

The most visually evident example of the pollution problem in Boston Harbor is the quantity of debris and refuse found within the Harbor area. Although this is not considered the most detrimental form of pollution, the sight of garbage and litter dumped on Boston's waterways and beaches has made a significant contribution to the degradation of the Harbor environment.

The two major adverse effects of the debris and refuse problem are: the severe deterioriation of the aesthetic qualities of the area; and the hazard to navigation presented by large pieces of floating debris. Although there are other related adverse effects, the fact that this type of pollution presents such a visible indication of deterioration makes it imperative to immediately attack this problem with a thorough, well-planned campaign. An area littered with debris and refuse will not evoke the same feelings of pride and cleanliness that an immaculate, well-kept area will. In fact, a run-down Harbor, complete with littered waterways and beaches may do much to encourage further pollution and continued degradation.

There are many sources of debris and refuse in the Harbor area; however, most of the blight can be blamed on human negligence and selfishness. The main sources of the pollution are: dumping material from shoreline areas; dumping from vessels; debris being washed from dilapidated shorefront structures and wrecked vessels.

Past efforts at cleaning up debris and refuse have focused on "after the fact actions" -- picking up trash from littered beach areas, and removing large floatables from the waterways to protect navigation.

In order to secure a clean Harbor, positive action must be initiated to ensure that debris and refuse are not deposited in Harbor waters. It is obvious that this complex problem will require innovative and perhaps controversial social, technical, economic, legal and institutional solutions.

The following recommendations for future action are aimed at solving the debris and refuse problem; however, it is important to note that each recommendation is related or linked to the solution of other Boston Harbor environmental problems. Suggestions for future action in dealing with the debris and refuse problem in Boston Harbor are:

1. Strengthen management, planning, and implementation of a program dealing with conservation and development of the Harbor

   The Commonwealth of Massachusetts should establish a permanent coordinating body for generally integrating planning, management, and implementation of federal, state and local programs in the Harbor. Specifically, one phase of the coordinating body's effort should establish procedures for surveillance and enforcement of laws relating to the control of debris and refuse.

2. Maintain a continuing program for oil and debris cleanup

   The Massachusetts Department of Public Works, Division of Waterways should purchase and operate, or contract for, an effective debris cleanup vessel capable of patrolling the

Harbor and removing foreign substances. If feasible equipment is available that could combine oil pick-up with debris removal, this vessel should be considered. This action is essential for the enhancement of the aesthetic values in the Harbor environment. Financial resources for this activity could be obtained from "unclaimed watercraft gasoline tax" receipts; operation and maintenance costs could be borne by user-charge arrangements with Harbor interests. Federal assistance from the Environmental Protection Agency should be explored.

3. Eliminate dilapidated structures and derelict vessels

   Eliminating the number of dilapidated shorefront structures by removal or repair combined with the removal of all derelict vessels will appreciably reduce the magnitude of this major source of debris. The Massachusetts Department of Public Works should extend its authorized program to have these decrepit structures rebuilt or removed; Corps of Engineers permits should insure proper maintenance of all new shorefront structures to be built.

4. Phase out offshore burning and dumping

   The transportation of debris to offshore burning sites and the disposal of man-made waste by ocean dumping aggravates the Harbor debris problem. Offshore burning and ocean dumping of wastes should be phased out and alternative more ecological methods of disposal or reuse should be instituted. The Massachusetts Division of Water Pollution Control, the Massachusetts

Division of Waterways, and the Environmental Protection Agency have legal authority to eliminate or severely restrict these practices.

5. Enforce laws that prohibit dumping into or adjacent to navigable waters

   It has been estimated that over 50% of the refuse found in Boston Harbor is a result of illegal dumping. Strengthened enforcement of existing statutes by the Coast Guard and the Division of Waterways and cooperative arrangements with other Federal, state, and local agencies could help to alleviate this situation.

6. Increase public awareness and involvement

   The cleanup of Boston Harbor requires the active support of the area's populace. Informing the public of their relationship to a pollution problem, and instructing the public on how they can be involved in correcting this problem will substantially aid in realizing the desired improvement. A State coordinating group should initiate a vigorous sustained public information program in cooperation with Federal and local agencies.

II. INTRODUCTION

A. Background

Boston Harbor is the nucleus of the Boston metropolitan area and represents the most important natural resource of the core city. In addition to being the largest seaport in New England, Boston Harbor could provide major recreational and environmental opportunities for the people of the area, including swimming, boating, fishing and visual and aesthetic enjoyment. Commercial pursuits include shellfishing, shipping, and transportation.

Unfortunately the full potential of Boston Harbor has been severely restricted by the degraded water quality conditions of the Harbor. The major factors that influence the water quality of the Harbor are:

1. Combined Sewer Overflows;
2. Debris and Refuse;
3. Oil;
4. Treated Wastes and Sludges from the MDC's Deer Island and Nut Island waste treatment facilities;
5. Tributary Streams;
6. Waste from Ships and Pleasure Craft; and
7. Storm Water Runoff.

Each of these factors is a complex problem requiring innovative and perhaps controversial social, technical, economic, legal and institutional solutions if improved water quality is to be achieved in the Harbor. Total commitment, including financial resources, by all levels of government, industry, civic action groups and concerned citizens will be necessary to accomplish the goal of clean water.

On May 20, 1968, April 30, 1969, and October 27, 1971, conferences were held by the Federal Water Pollution Control Administration* of the U.S. Department of the Interior on the pollution of the navigable waters of Boston Harbor and its tributaries in Massachusetts.

At these hearings, statements were heard from the conferees, representing FWPCA and the Commonwealth of Massachusetts, and representatives of various other Federal, State and local agencies. One of the recommendations emerging from the second conference was:

> ".... that a comprehensive water quality management plan, sections of which are currently under development by various agencies, be completed for the Boston Harbor Drainage Area by an inter-agency State, Federal, and regional group including, but not limited to, the Massachusetts Division of Water Resources, the Metropolitan District Commission, the Metropolitan Area Planning Council, and other appropriate agencies. The New England River Basins Commission has a statutory responsibility under the Water Resources Planning Act to prepare a comprehensive plan of water and related land resources for the entire New England area. The Commission can serve as a coordinating vehicle and integrate this water quality plan into the comprehensive water and related land resources plan for the Southeastern New England Region which includes Boston Harbor. The Massachusetts Division of Water Pollution Control and the Federal Water Pollution Control Administration should provide leadership for the group."

The Enforcement Conference established a schedule for preparing interim reports on the water quality problems of Boston Harbor. The following reports were published: Study Plan, May 1970; Projections of Population and Municipal Waste Loadings, September 1970; Progress Toward Achieving the Water Quality Goals for Boston Harbor, October 1970; Interim Report on Combined Sewer Overflows in Boston Harbor, October 1971. This last report discusses the Debris and Refuse Problem in Boston Harbor.

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*Now designated as the Environmental Protection Agency.

B. Objectives

The objective of this report is to examine the extent and magnitude of the Debris and Refuse Problem in Boston Harbor and how it affects water quality. Evaluation of this problem and alternative solutions are also presented.

The objective of this report will be met by the following three phases:

1. An examination of the existing conditions of Boston Harbor with respect to debris and refuse;
2. An exploration of the possible sources of debris and refuse in the Harbor and an estimation of how the Harbor will be affected in the future; and
3. Recommendations of various alternative methods of dealing with debris and refuse in Boston Harbor.

C. Scope

The scope of this report is limited to solid debris and refuse and how it affects Boston Harbor. It does not include oil pollution, vessel pollution, storm water runoff or sewer discharges.

The Report covers about 47 square miles of water surface and about 100 miles of shorefront. The communities that border on Boston Harbor are: Hull, Hingham, Weymouth, Braintree , Quincy, Boston, Cambridge, Everett, Chelsea and Winthrop.

D. General Definition of Problem

The full potential of Boston Harbor has been severely restricted by the deteriorated conditions of the Harbor's environment. It is a generally recognized fact that debris and refuse pollution has a significant adverse effect on the quality of life encountered in the Boston area. Not only does debris and refuse cause degradation to the water quality of the Harbor, but it also has serious consequences on the aesthetic value of the area. In addition to these effects, large pieces of debris present a hazard to navigation within the Harbor. Land values and recreational possibilities are severely depreciated by the quantities of garbage and litter found on area beaches and floating in the waterways.

An aspect of this type of visual pollution that should not be discounted is the psychological effect it has on the population that utilize the Harbor. An area littered with debris and refuse will not invoke the same feelings of pride and cleanliness that an immaculate, well-kept area will. In addition, a run-down Harbor complete with littered waterways will actually provoke further degradation.

This problem will be analyzed in the following four sections. Section III - Analysis of Problem discusses the origin and sources of the problem. Section IV - Impact of Problem on Harbor Environment discusses the various adverse effects caused by the problem. Section V - Current Remedial Action explains what is currently being done to alleviate the problem. Section VI - Recommendations for Future Action discusses several alternative actions that could be employed to eradicate the problem.

III. ANALYSIS OF PROBLEM

The debris and refuse problem in Boston Harbor can be attributed to a vast number of causes. Improvement of the Harbor area is dependent upon a planned campaign against these interrelated sources.

Sources of debris and refuse in the Boston Harbor area are:

A. Dilapidated shorefront structures.
B. Derelict wrecked vessels.
C. Dumping from vessels.
D. Shoreline dumping.
E. Tide, wind, and river carried debris from other areas.
F. Loose floatable onshore debris.
G. Shorefront dumps.
H. Storm sewer and combined sewer discharges.

A. Dilapidated shorefront structures

In a study authorized in 1966, the Corps of Engineers has been studying the cause, extent and seriousness of the existing debris problem in Boston Harbor. The Corps' study has focused on debris resulting from drift from dilapidated waterfront structures, derelict vessels and other injurious obstructions to navigation. Physical examination of the Harbor by the Corps revealed 300 wholly or partially dilapidated structures. This source represents a potential total volume of floatable debris estimated at 3,251,000 cubic feet. (Table 1, Pg.33) Chunks of debris are easily washed into the Harbor by wind or wave action working on these ramshackle structures. (See Photo No. 1)

B. Derelict wrecked vessels

In the same study the Corps located some 96 derelict wrecked vessels in the waters of Boston Harbor. An estimate of the volume of floatable

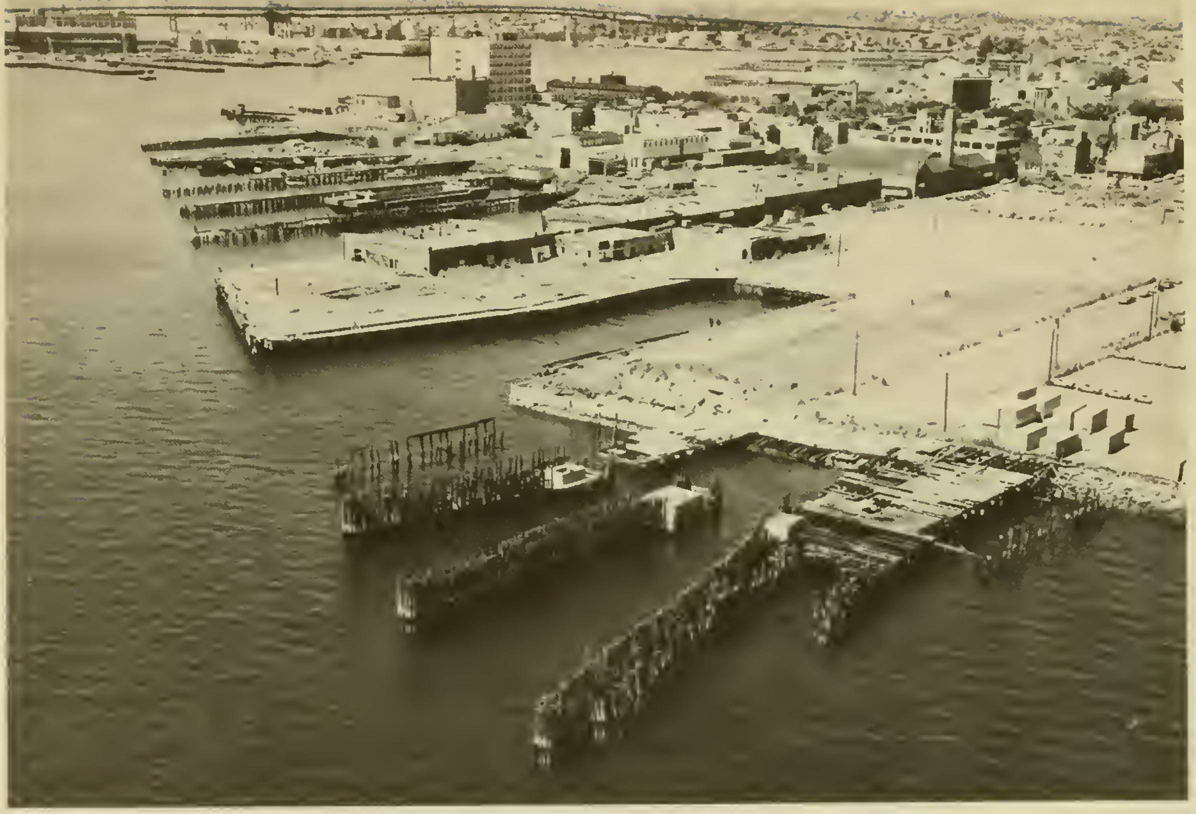


PHOTO NO. I - *DILAPIDATED SHOREFRONT STRUCTURES, East Boston shorefront area. Sumner and Callahan Tunnels cross the harbor at this point.*

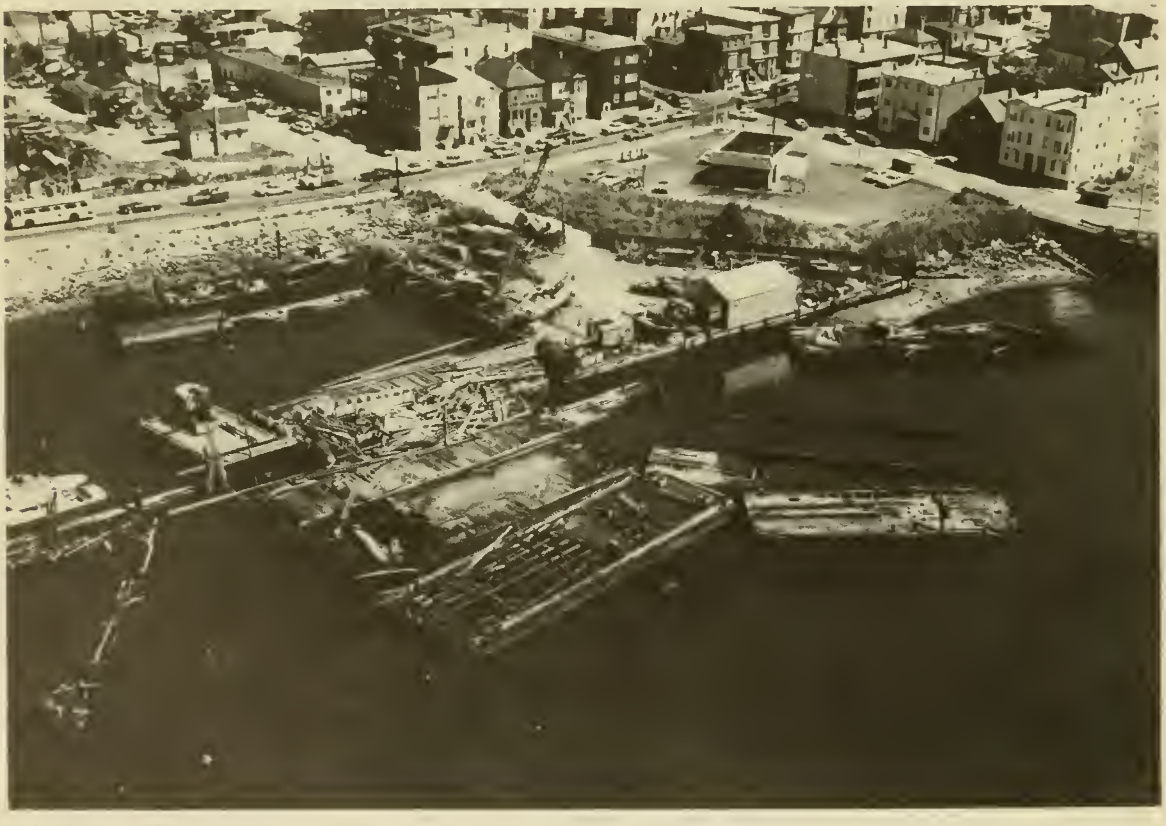


PHOTO NO. 2 - *DERELICT WRECKED VESSELS in the mouth of the Chelsea River, downstream of the Meridian Street Bridge, East Boston.*

debris involved was not completed because many of the vessels are either totally or partially submerged. Tide and wind action, coupled with natural decay breaks up these vessels into pieces of debris that add to the drift problem. (See Photo No. 2)

C. Dumping from vessels

A quantity of debris falls or is dumped from the hundreds of vessels that travel in Boston Harbor each day. In the past, debris collected in the area from refuse companies or from construction sites was taken offshore by barge and burned before being dumped at sea. Although legal dumping at sea has been substantially curtailed by new State and Federal laws, this practice is permitted under certain regulatory controls. No estimate has been made of the quantity of material illicitly taken offshore and illegally dumped at sea. Another related source of debris is the personal discard thrown overboard by the passengers or crew of vessels utilizing the Harbor; there is also the accidental loss of equipment or material overboard in wind or storm situations.

D. Shoreline dumping

The dumping of debris and refuse from the shore into Harbor waters is, of course, an illegal act; nevertheless, this is still considered to be the major source of debris in the Harbor. Corps' studies have estimated that 50% of the debris in Harbor waterways is a result of illegal dumping. The various forms of debris dumping range from residents, visitors, and workmen discarding garbage and litter from beaches, docks, bridges, and buildings into waterways, to the clandestine dumping of large quantities of debris from construction sites or other major sources.

E. Tide, wind, and river carried debris from other areas

The following rivers empty into Boston Harbor: Weir, Weymouth Back, Weymouth Fore, Town, Neponset, Reserved Channel, Charles, Little Mystic, Mystic, and Chelsea. Each of these waterways carries debris into the Harbor from upstream. In addition, wind and tides transport debris from many miles away into the Harbor environment; tide and wind action cause a continuous redistribution of flotsam and jetsam throughout the Harbor.

F. Loose floatable onshore debris

The Corp's inspection team uncovered approximately 73,800 cubic feet of loose onshore floatable debris. This debris, close to the waterways, is easily washed into the Harbor by tides, rainfall, or wind. The debris from this source has been washed ashore by tidal action and augmented by direct dumping on the shore areas. (See Photo No. 3)

G. Shorefront dumps

Solid waste disposal areas dot the entire Harbor area. These solid waste areas are utilized by industries, marinas, refuse companies, public facilities, and municipal sanitation departments. Because of their proximity to the waterways and because certain areas are not adequately fenced off or protected, quantities of debris and refuse from these solid waste areas can be transported by wind or water action into the Harbor. (See Photo No. 4)

H. Sewer discharges

One of the major pollution problems identified in Boston Harbor is the discharge of pollutants from combined sewers and storm water outfalls (NERBC - 10/71). In addition to discharging sewerage into the Harbor, these outfalls transport quantities of debris and refuse from the communities that encircle the Harbor. Examples of this problem source include: tree branches and leaves washed into the system, garbage and litter from streets and parking areas, and refuse dumped directly into sewer systems.

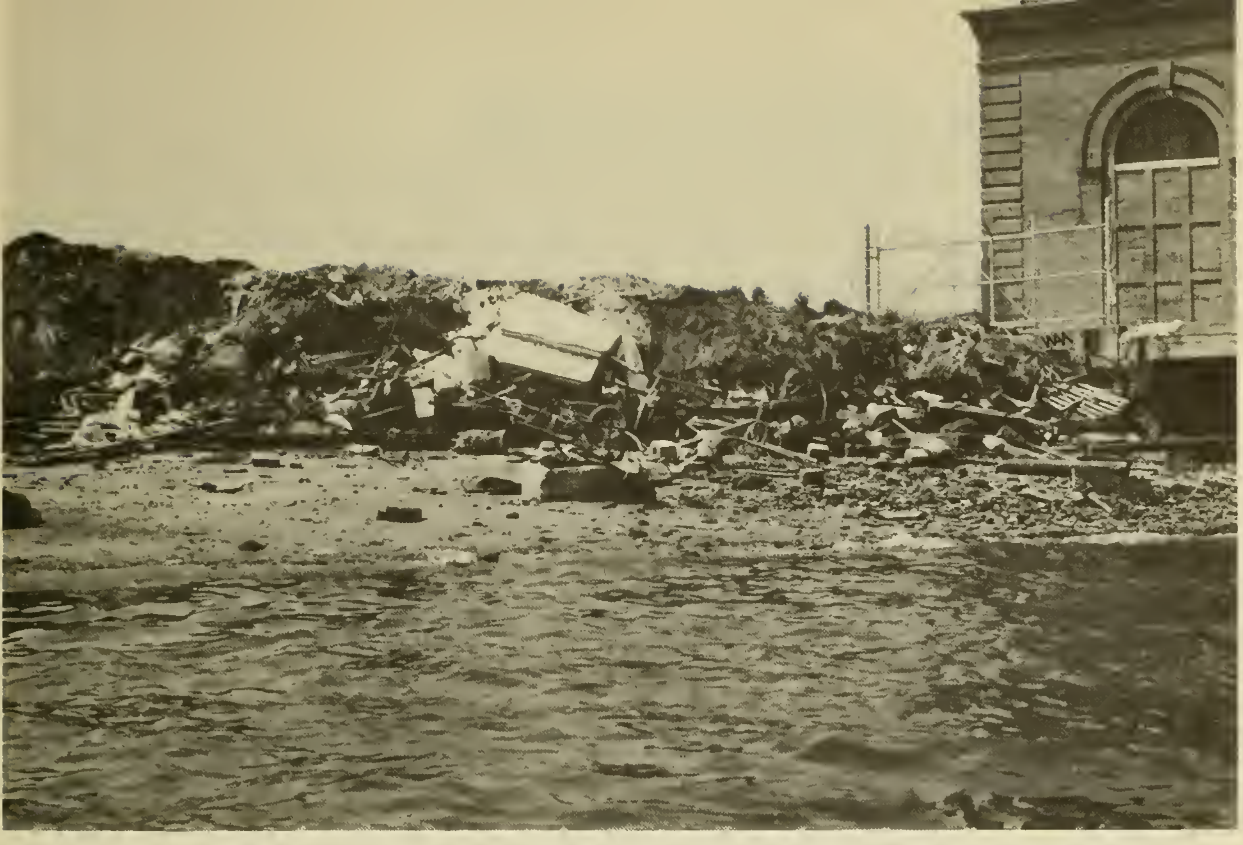


PHOTO NO. 3 - *LOOSE FLOATABLE ONSHORE DEBRIS*, *upstream side of the Chelsea Street bridge, Chelsea River, East Boston.*

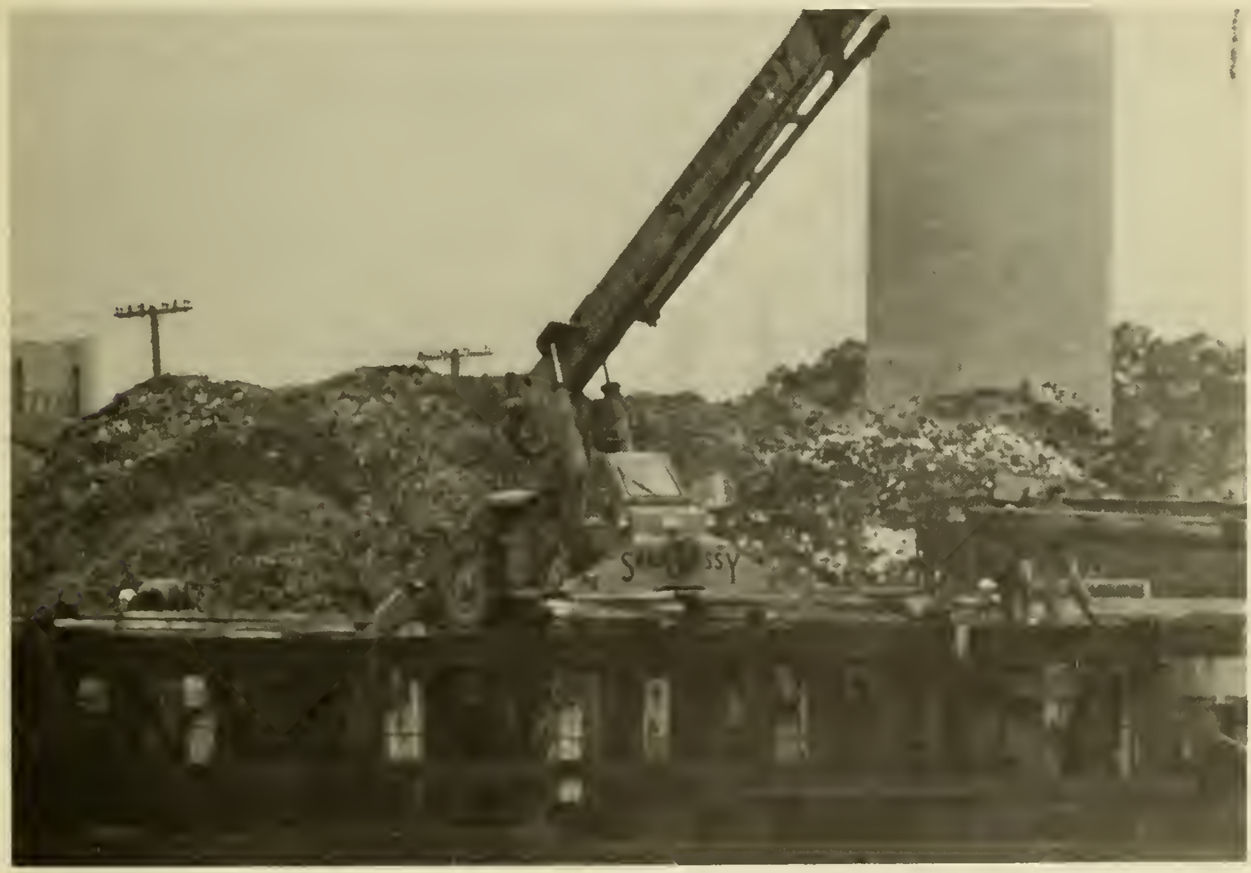


PHOTO NO. 4 - *SHOREFRONT DUMPS*, *upstream of the Mystic / Tobin Bridge, Mystic River, Charlestown.*

IV. IMPACT OF PROBLEM ON HARBOR ENVIRONMENT

The debris and refuse problem has had considerable adverse impact on the Boston Harbor environment. These adverse environmental effects do not follow simple "cause—effect—cure" relationships, but are often quite complex and interrelated. By listing these "effects" it is possible to recognize this interconnection, as well as the relative importance of each impact (e.g. litter thrown on a beach degrades the aesthetic value, which lowers land value, which reduces financial interest, which minimizes maintenance, which encourages further littering, etc.).

The following is a partial list of the effects caused by debris and refuse on the Harbor environment.

A. Adverse effect on aesthetics.
B. Hazard to navigation.
C. Degradation of shorefront areas and beaches.
D. Adverse effect on water quality.
E. Hazard to human life.
F. Fire hazard.
G. Breeding ground for pests.

A. Adverse effect on aesthetics

The primary adverse effect of debris and refuse on the Harbor's environment is the degradation of the aesthetic value of the area. Although the visual plunder of an area is the most obvious environmental assault, it is rarely identified for protection and correction because it is impossible to place an economic value on aesthetic qualities.

There are no statistical measurements that can be employed to determine the aesthetic value of an area, nor how important aesthetics are to the people who utilize the Harbor. Only personal observations and "gut" reactions can aid in evaluating the effect of seeing garbage floating in the waters or litter dumped upon the shores of the Harbor. Aesthetic deterioration, being the most noticeable problem, should be attacked first to light the way for other corrective measures. Certainly an area in a state of aesthetic deterioration will not elicit from the population the same degree of pride and civic protection that a clean, well-kept area would. In fact, a littered area has the general effect of instigating further littering and dumping, thus compounding the problem and increasing degradation of the Harbor. (See Photo No. 5)

B. Hazard to navigation

Large pieces of floating debris obviously represent a serious hazard to navigation within the Harbor. The Port of Boston is the largest seaport in New England, both from the standpoint of its waterfront facilities and the magnitude of its waterborne commerce. It is the Nation's 11th busiest port in the total trade category, and the shipping center for the industrial and commercial concerns of New England; waterborne commerce for 1971 was estimated to top 26 million tons. There are also a great number of pleasurecraft, commercial fishing and sport fishing vessels that utilize the Harbor. Floating or submerged objects hit by watercraft could cause severe damage to hulls, or propellers and could

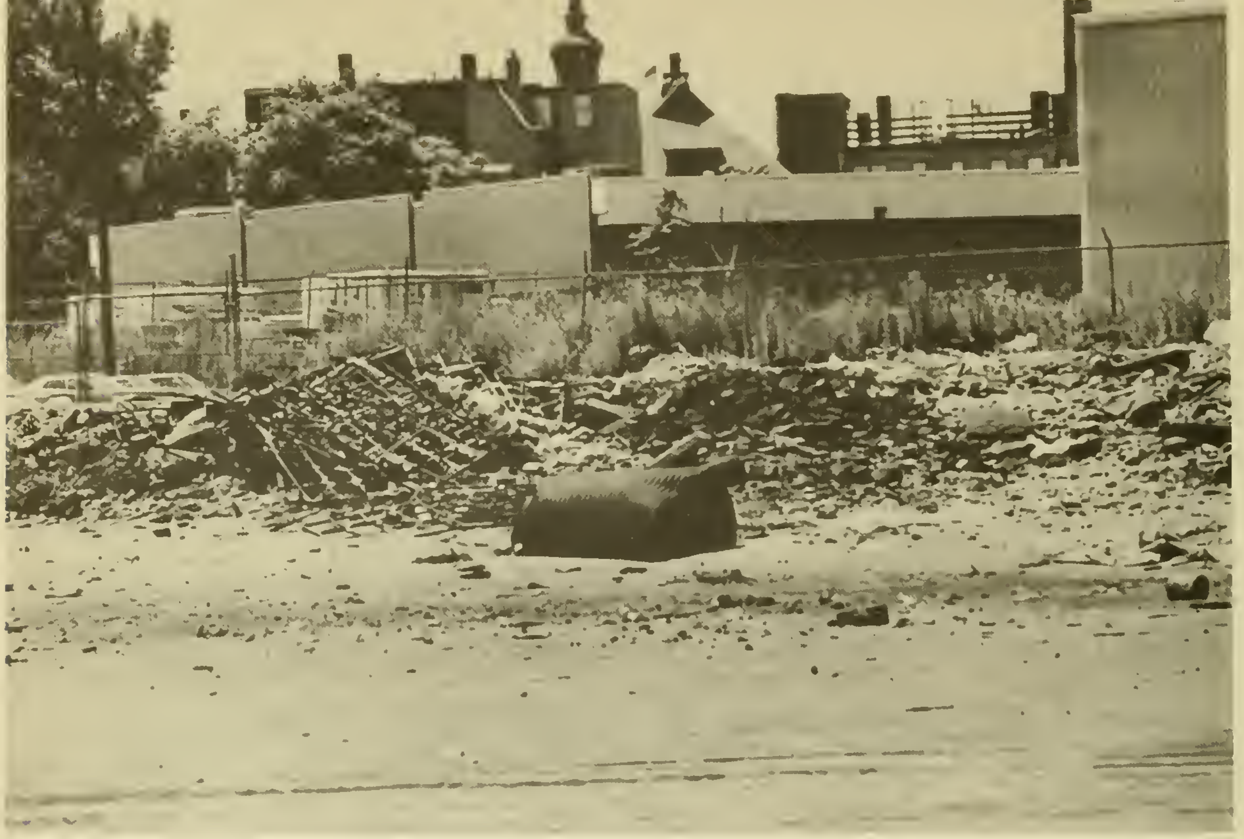


PHOTO NO. 5 - *ADVERSE EFFECT ON AESTHETICS* *Mystic River, Charlestown. Downstream side of the Malden Bridge. (Alford St.)*

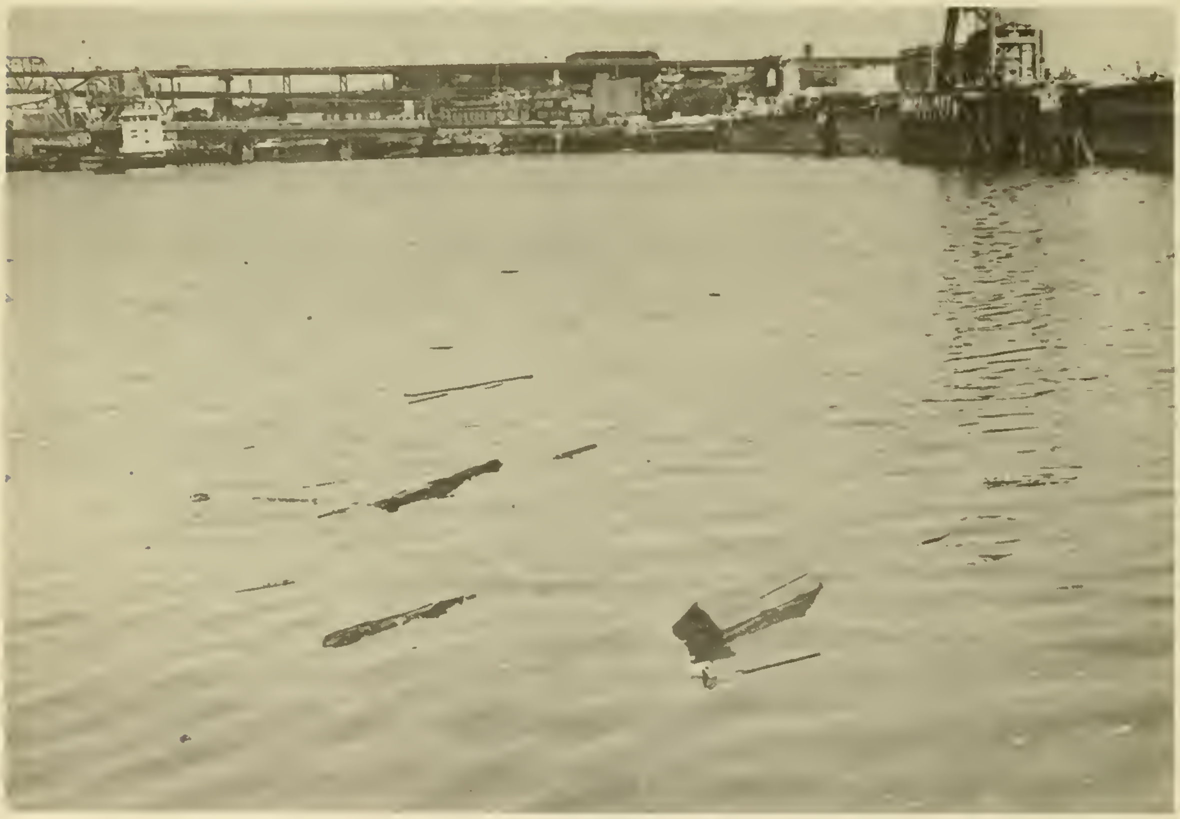


PHOTO NO. 6 - *HAZARD TO NAVIGATION. Floating debris in the mouth of the Chelsea River.*

result in complete loss of craft, personal injury, or loss of life. (See Photo No. 6)

The Corps of Engineers' Debris Study reported that there are approximately 4100 recreational craft based in Boston Harbor and that, in 1969, there were 410 reported motorboat-drift collisions. Estimates made in 1969 indicated boat owners paid approximately $130,000 to repair boats damaged by drift; commercial vessel damage was over $10,000.

C. Degradation of shorefront areas and beaches

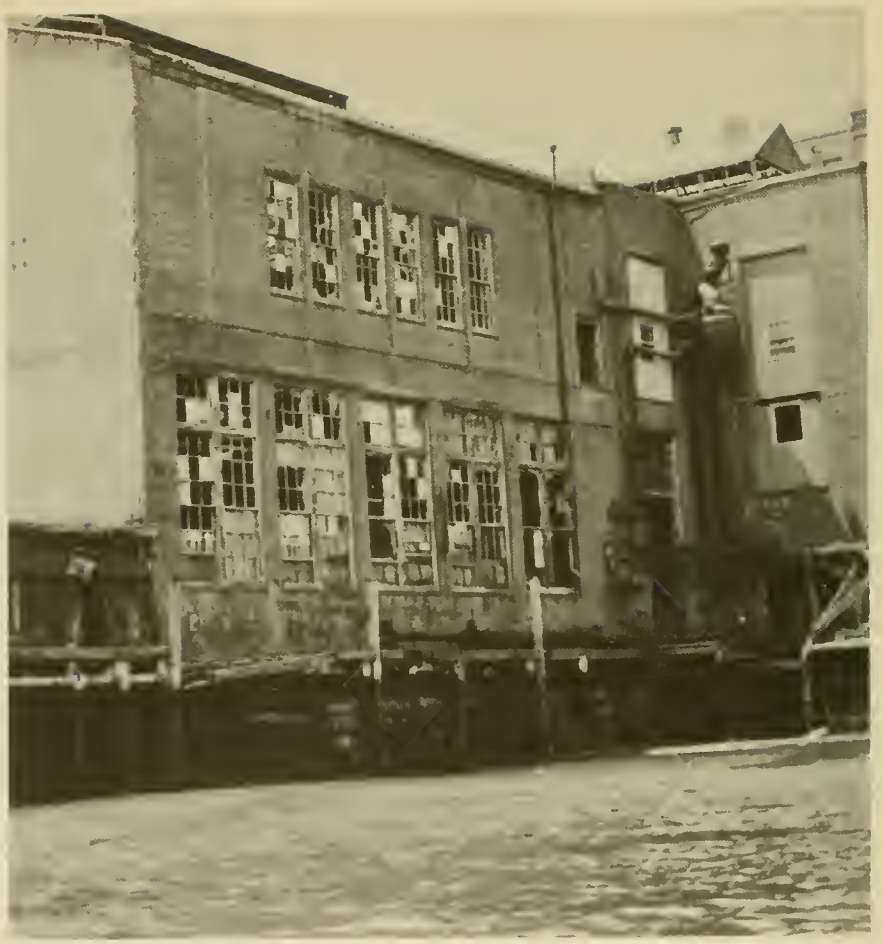
Boston Harbor shorefront areas and beaches have been severely degraded due to debris and refuse in the Harbor area. The litter and junk deposited on Harbor beaches and recreational areas restrict the use of these areas by making them unsafe and unhealthy as well as visually unattractive. Quite obviously, land use alternatives for shorefront areas are closely related to those areas' physical appearance; many land use possibilities for Boston Harbor have been eliminated by the existing deteriorated conditions. The reduced number of land use alternatives and the aesthetic deterioration present cause the landowners and communities around Boston Harbor to suffer financially. Land and property values in the Harbor are inversely proportional to the quantity of debris and refuse. (See Photos No. 7)

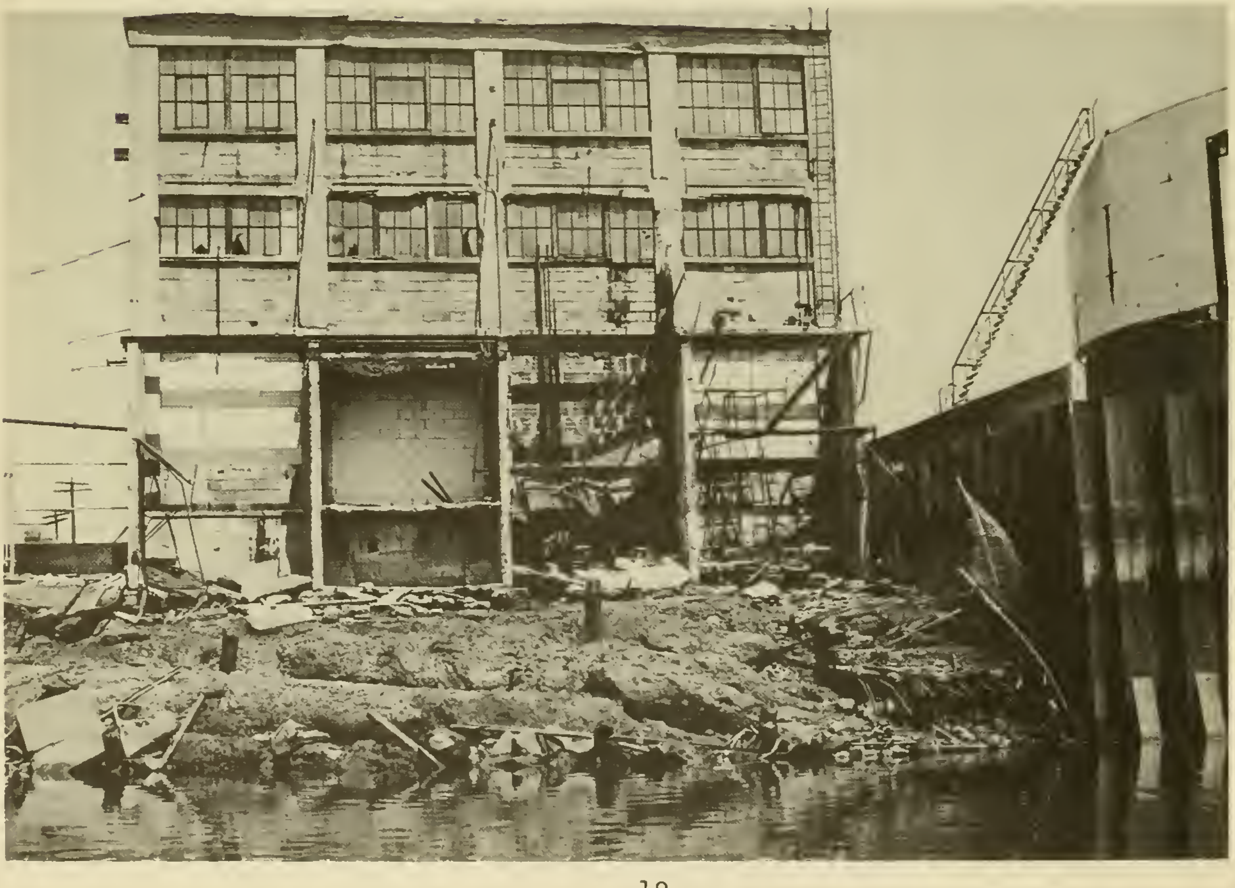
PHOTOS NO. 7

DEGRADATION OF SHOREFRONT AREAS.

Right: Vacinity of Commercial Wharf in the Boston North End.

Below: Chelsea River, Chelsea.





D. Adverse effect on water quality

Debris and refuse dumped into the Harbor will adversely affect various biological, chemical, and physical parameters of water quality. Anticipated effects on water quality include: increased suspended solids, increased BOD, increased turbidity, possible toxic chemical (e.g., creosote, heavy metals), possible odor and bottom sediment problems. Admittedly, these effects would be considered minor compared to the effects of debris on Harbor aesthetics and navigation; water quality degradation caused by debris and refuse is minimal when compared to other pollutant sources.

E. Hazard to human life

Debris in the Harbor endangers human life not only by presenting a hazard to navigation but by presenting a source of danger to swimmers in the area. Large pieces of splintered debris, armed with rusty nails, represent a serious menace to users of Harbor beaches and docks.

F. Fire hazard

Dilapidated Harbor structures, wrecked vessels, and loose onshore debris can provide fuel for dangerous shorefront fires.

G. Breeding ground for pests

Concentrations of debris and refuse can provide refuge for injurious rodents (e.g., rats), while floating debris provides home and transportation for marine borers.

V. CURRENT REMEDIAL ACTION

Current actions to clean up the debris and refuse problem in Boston Harbor are concentrated in two diverse functional areas: (a) picking up debris and refuse from beaches and waterways; and (b) eliminating sources of debris.

A. Beach and waterway cleanup

Beach clean-up operations have been sponsored by various governmental and civic organizations. These cosmetic actions cannot remedy the problem, but can only succeed in temporarily restoring sections of beach for recreational use. In addition to the regular maintenance programs for area beaches, there have been several beach clean-up operations sponsored by governmental and civic organizations. Publicized examples of these volunteer projects include Harbor Islands Cleanup efforts organized by Massport's Boston Harbor Pollution Committee and "Save Our Shores", and the Charles River Cleanup, sponsored by the Charles River Watershed Association in cooperation with the MDC and the Massachusetts Department of Natural Resources (DNR). The 1971 Boston Harbor Pollution Committee effort enlisted the aid of 400 persons who collected over 300 tons of debris from Long Island. Operators of public and private beaches in the Harbor area spend a great deal of time and money in the continuous clean-up effort required to keep their beaches in a condition fit for human use. The Metropolitan District Commission (MDC) operates the greatest number of area beaches, and therefore, is obliged to provide the largest proportion of the beach maintenance clean-up effort expended in the Harbor area. The MDC estimates that during the 1971 season, 3,654 tons of solid waste was removed from their beaches

(Table II,pg 34):that figure subdivides into 2,951 tons of "Mixed Trash" (picnic refuse, cans, bottles, papers, garbage, etc.), and 703 tons of ocean debris.

Starting in June of 1974, clean-up of debris from the Harbor's waterways has been accomplished by the Massachusetts Department of Public Works, Division of Waterways. Prior to this date, debris pick up was performed by a clean-up vessel under contract to the U.S. Army Corps of Engineers. The Corps' responsibility was to maintain navigation in the Harbor, consequently the purpose of their cleanup project was to locate and remove drift and floating debris that posed a potential hazard to navigation within the Harbor. The debris pick-up vessel, therefore, concentrated on large bulky floatables and did not attempt to clean up the smaller less dangerous quantities of refuse and garbage that found their way into the waterway. The Harbor was patrolled five times per week during the months of May through October, and two times a week during November through April. Past maintenance of this type yielded approximately 10,000 cubic feet of debris annually. (Table III, Pg. 35)

The Division of Waterways has contracted for a clean-up vessel which patrols the Harbor five days a week. This vessel is clearly recognizable as it sweeps the harbor because of the large sign aboard advertising the program and phone numbers to call for action. (See Photos No. 8)

B. Eliminate sources of debris

Chapter 878 of the Massachusetts Acts of 1970 provided for the Massachusetts Department of Public Works, Division of Waterways to expend a certain portion of the unclaimed watercraft gas tax rebates to

PHOTOS NO. 8 - *WATERWAY CLEAN-UP. Removal of debris from the Harbor's waterways.*

clean-up and maintain the waterways and Harbors of the Commonwealth. The main thrust of this Act was to eliminate the many dilapidated shorefront structures which constitute a major source of floatable debris. This Harbor Clean-Up Fund accrues at a rate estimated at $800,000 per year; however, only $75,000 was appropriated for each of Fiscal Years 1972 and 73. The Division of Waterways' budget for fiscal year 1974 requested money from this Fund to be utilized for: (1) Purchase of equipment for continuous Harbor clean-up: (2) Clean-up of selective shorefront areas including removal of dilapidated structures; and, (3) a comprehensive study of Boston Harbor including the effect of an extensive clean-up operation on the alternative options for utilization of the Harbor. Actions in July, 1973, by the State government, caused the Division of Waterways to modify their effort to conform to the following three part plan: (1) Notify owners to clean-up or remove dilapidated shorefront structures; (2) Hire a private contractor to daily clean waterways and beaches; and (3) Remove certain wrecked vessels and discarded automobiles from the waterways.

The Division of Waterways conformed with this plan of attack which has resulted in some striking visual improvements. Letters were sent to approximately 50 owners of the alledgedly dilapidated piers in the Harbor, requesting them to rehabilitate or remove these structures. Some owners have responded favorably, but most are delaying action. The Division, through contracts, has removed two barges and 39 automobiles sunk in Boston Harbor. In addition, a contract to remove nine barges along the Harbor Islands' shoreline will soon be completed.

VI. RECOMMENDATIONS FOR FUTURE ACTION

Cleaning up the debris and refuse problem in Boston Harbor is not going to be accomplished by any single mutually exclusive action. The problem is compounded by the numerous sources and the complex interrelationships among the sources and resultant effects. Consequently the solution will not be a single solution, but a balanced attack utilizing combinations of various alternative actions. Because of the need for a well-balanced, environmentally conscious approach, the point to be stressed is that planning and management for the Harbor area should encompass all phases of that complex environment.

Some of the suggested alternative actions to be utilized in cleaning up Boston Harbor, with specific emphasis directed to the debris and refuse problem, are as follows:

A. Strengthen Management and Planning Capabilities;
B. Maintain a Continuing Program for Oil and Debris Cleanup;
C. Eliminate Dilapidated Structures and Derelict Vessels;
D. Eliminate Offshore Burning and Dumping of Debris;
E. Enforce Laws that Prohibit Dumping into or Adjacent to Navigable Waters;
F. Increase Public Awareness and Involvement.

A. Strengthen management and planning capabilities for Harbor environment

It is evident that Boston Harbor is a valuable resource to the people of Boston, the State of Massachusetts, and the entire New England area. Planning and management for this resource should consider all aspects of the Harbor environment, and should be cognizant of the needs of the population. Management of Boston Harbor is currently being ineffectually controlled by an assemblage of municipal, state, Federal, regional, private, civic, commercial and public interests. No one organization has the statutory authority, nor the capability to properly manage or plan for the Harbor; organizational efforts tend to break down into individual bureaucratic power struggles or special interest lobbying.

Boston Harbor needs and deserves a coordinated planning and management arrangement. All phases of the Boston Harbor environment, (i.e., air pollution, water pollution, land use planning, shipping, commerce, transportation, recreation, etc.) should be included under this synchronized effort. Planning for the complete Harbor environment would prevent special interest groups from destroying options or alternative courses that may prove more valuable; (e.g., taking up all Harbor shorefront land for luxury apartments would destroy opportunities to: receive ocean shipping; offer transportation alternatives; provide recreational access).

Although securing a coordinated planning and management effort is the primary prescription for the health of Boston Harbor, realization of this objective will be most difficult. The desired coordination could come from: (1) creation of a new autonomous organization with the single purpose of controlling Boston Harbor; (2) strengthening an existing State or local agency with sufficient statutory authority; (3) vastly improving coordination among the numerous agencies now involved; and (4) establish "Lead Agency" to provide initiative and overall management functions.

An example of an attempt at centralizing comprehensive authority in a single regional organization is the San Francisco Bay Conservation and Development Commission. Efforts by the Massachusetts Legislature have been aimed at obtaining the required coordinated approach through the use of special commissions and task forces. Chapter 44 of the Acts of 1972 set up a commission made up of Legislative, State, City and private members, to investigate and study pollution abatement and waterfront development. This commission investigates problems and recommends action; however, it does not have the authority to carry out these recommended actions. Another possible approach was made available in January 1974, when the Governor designated the Massachusetts Executive Office of Environmental Affairs as the Lead Agency in the development of the Commonwealth's Coastal Zone Management (CZM) Program. The CZM Program calls for the establishment of a Coastal Resources Review Center which when funded could address itself to the coordination of the Harbor's clean-up as a prime responsibility. In February of 1974, the Governor appointed a 30-member Task Force on Coastal Resource Management to provide guidance and share in the management of the CZM program. This Task Force made up of Cabinet Secretaries, legislators and representatives of local government, business and citizen groups provides an opportunity to realize the comprehensive planning and coordinated effort required for management of Boston Harbor.

It is recommended that the Commonwealth of Massachusetts should establish a permanent coordinating body for generally integrating planning, management and implementation of Federal, state and local programs in the Harbor. Specifically, the coordinating body should establish procedures for surveillance and enforcement of laws relating to the control of debris and refuse.

B. Maintain a continuing program for oil and debris cleanup

A cleanup vessel capable of patrolling the entire Boston Harbor area and removing foreign substances from the waterways is essential to the well-being of the Harbor environment. The desired vessel should be fitted with a scoop and a hydraulic crane for removing debris from the waters. The retrieved material can be stored onboard the vessel or loaded onto a barge for transport to an appropriate disposal site.

The feasibility of vessels equipped with special pumps and skimmer devices for oil pick up should be evaluated. If practicable machinery is available, the vessel could be fitted with oil clean-up equipment and storage tanks for holding the oil skimmed from waterways and thus, serve the dual purpose of debris removal and oil spill cleanup. The City of Buffalo, in conjunction with EPA, is currently studying such a cleanup vessel in the Buffalo Harbor area. (See Photo No. 9)

Financial resources for vessel purchase could be secured from "unclaimed watercraft gasoline tax" receipts; operation and maintenance costs could be borne by user-charge arrangements with Harbor interests. Federal assistance from the Environmental Protection Agency should be explored.

C. Eliminate dilapidated structures and derelict vessels

The Corps of Engineers study revealed about 300 waterfront structures either wholly or partially dilapidated, and about 96 wrecked vessels within the Harbor area. These two sources present an eyesore to Boston Harbor visitors and seriously degrade the aesthetic quality of the entire area. Dilapidated structures and wrecked vessels represent an estimated 4,000,000 cubic feet of debris that could find its way into the waterways. The initial estimate indicated a cost of $7,000,000 to $10,000,000 to remove and dispose of these sources of debris. (See Photos No. 10)

Since 1970, construction of new structures in the Harbor area require permits from the Corps of Engineers. Among other stipulations, this permit should require adequate construction and cleanup practices and it should make it a requisite that owners keep the structures in good condition or remove them before they become further sources of debris.

Eliminating the number of dilapidated shorefront structures and derelict vessels will appreciably reduce the magnitude of this major source of debris. The Massachusetts Department of Public Works, Division of Waterways, has been authorized to remove these decrepit structures; Corps of Engineers permits should require proper maintenance for all new shorefront structures to be built. It is also recommended that a program of public acquisition of shorefront property accompany the clean-up program to insure maximum public benefits from public expenditures.

D. Eliminate offshore burning and dumping

In the past, great quantities of debris have been dumped into the ocean under the misconception that this resource could be utilized as an infinite garbage dump. Material from construction sites, refuse clean-up programs, industrial operations, and dredging projects have been indiscriminatively dumped into the Atlantic Ocean; the fact that some of

PHOTO NO. 9

Buffalo Harbor area cleanup vessel under study by the city of Buffalo and EPA.

PHOTOS NO. 10 - *DILAPIDATED STRUCTURES AND DERELICT VESSELS. Above: Thompson Island, Dorchester Bay, Boston. Below: Chelsea River, Chelsea.*

this material found its way back into the Harbor was only one of the many adverse effects of this practice. With the passage of the new ocean dumping legislation in 1972, (i.e. Water Pollution Control Act Amendments, and Marine Research, Protection and Sanctuary Act), utilization of the ocean for dumping purposes should be restricted to cases of minimal environmental effect. In addition, consideration should be directed at the reuse and recycling of materials that are currently being wasted. For example, the disposal of the large timber piles from the dilapidated shorefront structures presents several alternatives other than the currently proposed method of offshore burning. Possible alternatives: re-use wood to make pallets; run wood through a chipping operation for use in soil conservation; utilize wood for power generation, either for home use or industrial applications.

It is recommended that all offshore burning and dumping be eliminated except in cases where this represents the least environmental cost. In all cases, opportunities for resource recovery and recycling should be encouraged by those agencies regulating these disposal activities. (EPA, DNR)

E. Enforce laws that prohibit dumping into or adjacent to navigable waters

There are currently laws on the books which, if enforced, could do a great deal to eliminate the debris and refuse problem in the Harbor. These statutes range from local anti-litter laws to the Refuse Act of 1899. The Refuse Act of 1899 provides in part that it is unlawful to "throw, discharge, or deposit... from any floating craft, from shore, wharf, or manufacturing establishment, any refuse matter of any kind or description whatever into any navigable water...; and it shall be unlawful to deposit material on the bank of any navigable water..., where the same shall be washed into such navigable water..." without a permit from the Corps of Engineers. These laws coupled with the Water Pollution Control Act Amendments of 1972 should provide government and the interested public with an effective enforcement arsenal to battle the debris and refuse problem. However, to date enforcement has seen only a minimal effort with patrol and inspection being inappreciable. (See Photos No.3 and No. 5)

Dumps and other solid waste disposal areas should be kept away from navigable waters, or at least surrounded by appropriate retaining structures so that this source should not contribute further to the problem.

Strengthened enforcement of existing statutes by the Coast Guard and the Division of Waterways and cooperative arrangements with other Federal, state and local agencies could help to alleviate this situation. The MDC, DNR and local police should strengthen programs for investigation and enforcement of litter and dumping violations. The public should be made aware of this program and who to contact for action.

F. Increase public awareness and involvement

When you dissect most environmental problems down to their basic cause and cure, the inevitable conclusion is that "The problem and the solution both rest on the shoulders of the individual members of society". The debris and refuse problem in Boston Harbor is a prime example of man-made degradation of our environment; only a minor quantity of the junk found in the Harbor can be attributed to sources other than human negligence and selfishness. Improving man's conscience toward his environment is a monumental task; one that will involve re-educating ourselves with respect to our environment.

Increasing the public's awareness of environmental problems and obtaining their involvement in finding solutions is far superior to legislating "conscience" or punishing offenders. The following lists several suggestions for increasing public awareness and involvement in cleaning up Boston Harbor:

(1) Educational programs stressing need for protecting the environment and how to become an involved citizen;

(2) Advertising campaign aimed at informing the public of problems and how each individual contributes;

(3) Increase public access to area - including boat tours, improved beach areas, historical sites, etc.;

(4) Support of local conservation groups;

(5) Encourage public participation in prosecution of violators, planning for area;

(6) Facilitate public's involvement in maintenance and cleanup efforts by making litter baskets and other refuse collection arrangements convenient to Harbor users.

TABLE 1: BOSTON HARBOR DEBRIS STUDY

1968-1969 Visual Examination of Debris Sources
in Boston Harbor, Mass., Conducted by
Corps of Engineers, New England Division

COMMUNITY	TIMBER STRUCTURES			WRECKED VESSELS				
	Number Dilap-idated	Number w/portions Dilapidated	Approximate Tot. Volume (cu.ft.)	Number	Wood	Steel	Volume (cu.ft.)	Loose On-shore Debris-Floatables Approx. Volume
Boston	83	64	2,166,000	51	50	1		29,000
Cambridge	2	1	9,500	0	--	-	I	--
Everett	3	1	199,000	1	--	1	N	7,500
Revere	3	0	14,000	3	3	-	C	3,000
Somerville	1	0	13,000	0	--	-	O	2,000
Winthrop	7	2	31,000	3	3	-	M	1,700
Chelsea	19	13	337,000	4	4	-	P	8,400
Quincy	18	2	102,000	8	8	-	L	5,000
Braintree	2	0	500	0	-	-	E	200
Weymouth	8	1	18,000	2	2		T	1,200
Hingham	12	13	264,500	1	-	1	E	3,800
Hull	14	6	39,000	3	3	-		12,000
Islands	14	2	57,500	20	11	9		Incomplete
TOTALS	186	105	3,251,000	96	84	12		73,800

TABLE II: SOLID WASTE FROM MDC, BOSTON HARBOR RESERVATIONS

1971 Season

Reservation	SOLID WASTE IN TONS[1]		
	Mixed[2]	Ocean Debris[3]	Total
Boston Beaches[4]	450	15	465
Wollaston Beach	390	313	703
Georges Island	32	18	50
Peddocks Island	12	23	35
Lynn & Nahant Beach	450	11	461
Winthrop, Short & Constitution Beach	153	8	161
Nantasket Beach	375	305	680
Revere Beach	1,089	10	1,099
TOTAL (TONS)	2,951	703	3,654

(1) Quantities were estimated by MDC personnel, not actual weighing results.
(2) Mixed Solid Waste - includes picnic refuse, cans, bottles, paper, garbage.
(3) Ocean Debris - ocean materials washed ashore.
(4) Boston Beaches - Castle Island, Pleasure Bay, City Point, Carson, Savin Hill, Malibu, Tenean.

TABLE III: DEBRIS PICKED UP IN BOSTON HARBOR by CORPS OF ENGINEERS CONTRACT

(Cubic Feet of Material)(1)

MONTH	FY-1970	FY-1971	FY-1972	FY-1973	FY-1974
July	1,296	2,484	929	891(2)	729
August	1,431	2,889	1,075	772	956
September	1,701	2,673	929	977	724
October	1,323	2,754	805	416	702
November	432	1,080	335	54	97
December	621	1,053	275	232	54
January	1,026	1,026	259	313	97
February	864	421	383	297	135
March	918	270	297	227	324
April	1,107	459	248	286	367
May	2,970	1,291	653	875	594
June	2,646	1,069	513	707	135
TOTALS	16,335	17,469	6,701	6,047	4,914

(1) Quantity estimated by Boat Operator.
(2) No data (estimate).

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